FEEDBACK on the
Sample Environment STAP Report from October 2018

We remain convinced that the team leads should use every opportunity to work together on projects. This is happening, and has already led to several observable benefits, and should be further facilitated by the team management.
The team increasingly works together on joint projects though there is always potential for improvement and creating synergies.

We encourage the team to continue to work on recruiting and retaining technicians.
Though many team members stepped in to help the situation, the lack of technical resources in the last 5 months impacted on the project plans especially related to PREMP. Lauritz Saxtrup started March 1 as PREMP technician. We have also (finally) started the recruitment of a Laboratory technician for FLUCO.

Communication with instrument teams: The level of interaction between instrument teams and the Sample Environment team leads is healthy. It is clear that documentation and advice is available to instrument teams, and that embedding in the Tollgate process is working. The Sample Environment team need to make sure that this continues, and double-check that no instrument teams develop problems related to sample environment.
Instrument (sub-) tollgate reviews are taking place at an increased pace. Though we are only participating in those relevant to the sample environment team e.g. cave design they represent a significant work load for those involved.

The efforts over the past few years by the Sample Environment team on common standards where possible is clearly paying off. This should be complemented at this point by the establishment of a list of preferred equipment for sensors, valves, etc., and a defined preferred method for integration.
Floor-mounted alignment standard prototype for Sample Environment Systems has been procured and assembled in Utgård lab; Test bed Flange-mount standard prototype has gone through detailed design and is at procurement stage. These projects have benefited from improved design support both via ESS and external companies. Next steps are to integrate our Sample Environment Systems into this standard. In addition, a motorized "scanning" set-up for alignment and beam characterisation has been developed and online test scheduled at V20 in April 2019. During the recent IKON meeting we could see the interest of the instrument teams to profit from our standardisation efforts and the corresponding developments.

Safety and Quality Assurance: In our previous report, we noted that we were happy to see that a health and safety engineer had been appointed to NSS. At this point, the impact of this appointment is not yet clear. It is not clear how in-kind partners will deal with the CE certification requirements as yet. The Sample Environment team leads have been making progress in working with the legal safety requirements, partially through setting up test experiments in the Utgård laboratory. External consultants have also helped with high pressure research safety considerations. However, the STAP thinks that improvements in this area could and should be made faster. This is a subject to be monitored by the STAP in future.
Unfortunately, external consultancy hasn't been as helpful as originally envisaged. The problem is that the devices are just too specialized and out-of-the-box and the teams figure out performing adequate safety hazard analysis themselves. This still includes a pressure test facility in Utgård both to enable real-world testing of hazards from pressure devices and to drive certification requirements.

Interactions with other ESS groups - 1: In our last report, we highlighted that the support provided from ICS and DMSC did not meet the team's needs. This remains the case for interaction with ICS, and the lack of resource in ICS to support Sample Environment is stopping the completion of projects in a timely fashion. This is particularly affecting the MESI section. The delineation of responsibilities between the different groups is not yet clearly defined. We would like to see a defined point of access (in person or group) to ICS resources and procedures.
There has been improvement here, primarily due to the establishment of the beamline controls team BCT. All NSS integration shall be coordinated via BCT and Anders Pettersson is taking an active part

in BCT e.g. drives the sample environment topics forward. BCT is still in a phase of establishing itself and resourcing from ICS is still not fully clear. We are worried that progress will remain slow until resourcing on ICS side is improved. Instead of relying on ICS resources only MESI will instead provide a (MESI controlled) server and utilise simpler systems for EPICS deployment until the ICS software tools are fit for use. Currently the focus has been to finalize some project into a "basic" but usable status. A key example has been the scanning-alignment project. For this, ICS helped develop software to read images from alignment cameras. In addition, a motor stack has been specc'ed with support from MC group and is under procurement. In parallel, stages borrowed from V20 will be integrated into SEE-mount standard and tested online at V20 April 2019. We have identified key challenges for scan normalization (particularly for continuous scans) and are working smoothly with DMSC on this.

Interactions with other ESS groups - 2: In the PREMP area of activity, some design and construction tasks have been done with assistance from an external engineering company. Presumably, this expertise also exists in-house. The STAP strongly recommends using this in-house expertise. For time-sensitive work, external resources cannot always be relied upon.
Experience so far has been that external company is faster, cheaper and better than in-house. "In-house" resources are typically contractors anyway and there is no guarantee that they will be around in the long term. This is clearly a systemic structural issue for the ESS but, within PREMP, I have found workable solutions by going external. This said, we are also using 'in-house' design resources coordinated via Zvonko Lazic when available and adequate. However, as also this relies on contracted resources we are exposed to availability fluctuations due to contractual issues.

Sample Environment Management Structure - 1: In our previous report, we noted that there were some issues with work balance and mission creep for the Sample Environment staff. We made several suggestions regarding ways to combat this so that the Sample Environment team is primarily focussed on sample environment issues.
Still significant efforts are spent on 'non-core activities' to support ESS as a whole but not matching the specialist competences of the team members.

Sample Environment Management Structure - 2: In the documentation provided, a new management structure was proposed, involving the formation of a Sample Environment group (with group leader) and the existing teams forming sections within this group. The STAP is broadly happy with the proposed structure. We consider that this reorganisation should assist with group identity and work balance. This should assist with horizontal integration of the different Sample Environment teams. However, the role and duties of the group leader will need to be well defined, and we anticipate that it will be difficult to recruit the right person, who will need technical expertise and established person management skills.
We are envisaging to establish the line organisation towards operation and have postponed the recruitment of a sample environment group leader for later this year. From a management point the MESI activities will stay directly with the future group leader. However, at the same time MESI take an active role within the new BCT and we will follow closely how this team is developing towards operation.

Sample Environment Laboratories -1: The STAP is pleased to see that some of the funding issues for laboratory outfitting have been resolved since our last report. The STAP has reviewed the laboratory layout plans, and is broadly satisfied. From the information supplied, it is not clear what is planned for MESI's laboratory requirements. Some points that are not yet clarified are the storage location for helium dewars, and the presence of crane drop-off and pickup area. The STAP suggests that the team run through what is needed for an example change of equipment, e.g. outgoing cryostat to magnet with dilution.
We have revised our use cases and worked closely with the same company in charge of fitting the laboratories. We will present the refined plans during the STAP meeting and look forward to your input. On site labs in construction are looking fantastic (only barebone walls now, but still) despite some deviations to plan the initial plan. MESI have managed to confirm that ICS infrastructure team will handle the network installation from switches back to therein communication rooms taking care to provide desired number of physical connections the the various networks. ICS shall also supply a limited number of network outlets within the workshops but the remaining ones require installation by SAD. We also stay on top of the future SE workshops in the campus/B02 area.

Sample Environment Laboratories -2: The development of the bunker for pressure cell testing is proceeding well.
This work has stalled due to lack of technician, planned to re-start March 2019.

Sample Environment Laboratories -3: The current Sample Environment laboratory space at Utgård is now some distance from the main offices for the Sample Environment staff, and this may be a problem.
Travel between Utgård and site is indeed a problem, with typically 15-30 mins lost several days per week for some of the team. The Utgård lab is in principle fully functional now. Naturally new equipment and tools need to be continuously added. Network issues prevails, but this have now been addressed on a higher level and is expected to be addressed.

In-kind contributions: The STAP is interested in monitoring more closely the procedures and handling of the in-kind projects selected by the Sample Environment team. We would like to focus on this more in our next meeting. At present, we are primarily concerned with the MAGIC magnet proposal. We ask the TEFI lead to monitor the MAGIC magnet procurement process (being carried out by in-kind partners) carefully. This project represents a significant investment. The current plans are to adapt the original design so that it can be used on other diffraction and spectroscopy instruments; we encourage the Sample Environment team to make sure that other interested instrument teams are happy with the proposals as this constitutes a major (risky) investment. From the information available to the STAP at this time, the feasibility of this for multiple instruments is not yet clear, nor is the cost to the MAGIC science and business case for making the adaptations from the original design. The STAP would like to see detailed further information on this at the next STAP meeting.
After consultation with the spectroscopy STAP and instrument scientists, it is clear that there is a need for a dedicated magnet for spectroscopy, with priority for higher field and low background rather than maximum aperture. The 'MAGiC' magnet design prioritises aperture in a way that is less than ideal for these other use cases. However the budget for such a magnet dedicated to spectroscopy has been removed from the construction scope (in fact reserved for contingency). With this in mind the MAGiC magnet will be designed in such a way as to be optimized for single crystal diffraction, but includes a vacuum flange at the ESS standard distance from the beam height, such that it can be used on top loading vacuum tank based instruments (CSPEC, T-REX and hopefully DREAM with its vacuum tank in position). We also plan to minimize material in the main beam path for all the envisaged instruments, allowing for several entry points for the beam (also including HEIMDAL). These features should not compromise the MAGiC science case. We have collected requirements for a cryomagnet dedicated to spectroscopy, and this will be pursued as a priority when funds become available (bearing in mind long lead times). In further mitigation, we continue to expect that some second hand equipment, including cryomagnets, will be available, though with a lower field range.

PREMP: The comments on safety and engineering resources above are relevant here.
We are putting various systems in place including all their documentation: A pressure driving station has been built providing a mobile platform for both gas (<200 bar) and hydraulic (<2000 bar) pressure. Anvils assemblies and gaskets for the PE V3 are under fabrication locally with the aim of pressure-testing PE cell. Testing requires the development of a pressure-test facility planned in Utgård. Collaborative opportunities have been identified amongst 3 VR (Swedish research agency)-funded high-pressure projects. So far, PREMP has worked on cell developments and testing of cryogenic load gauges. Initial design for uniaxial strain cells have been tested at ILL (by P. Deen). These devices primarily benefit spectrometers and magnetic diffraction. Collaboration with ORNL continues; current focus on pursuing a licensing agreement so that ESS can fabricate ORNL DAC designs.

TEFI: The common standard for cryostat/cryomagnet rack wiring needs to be developed. TEFI and MESI need to clearly define responsibilities for issues such as wiring (at low temperature and room temperature). The plans for auxiliary systems, such as pumping systems or gas handling systems, need to be developed further.
We have agreed a division of responsibility such that room temperature wiring is the responsibility of MESI, and low temperature/in-vacuum wiring is the responsibility of TEFI. We have put together a prototype pumping trolley, using vacuum pumps, valves and gauges recommended and supported by the vacuum group. In collaboration with MESI, we have started the process of automation of the pumping trolley, beginning with the flushing cycle for the sample space, and will continue with automation of the needle valve.

MESI: A decision should be made regarding SECoP, as to whether it is fully detached from ICS, or integrated with EPICS. The latter would be preferable.
SECoP is in a very intense implementation phase. Work is progressing well and most functions and interfaces are relatively well defined and understood. The focus on finishing SECoP project put quite some pressure on staff involved. Approximately 1.25FTE will focus on SECoP in at least Q1-Q2 to meet deliverables. It is however also important to note that part of the work now, is to start the process of making SECoP an integral part of the SE control system. This process will require efforts in the coming years. Some of the benefits in this work are also that MESI is developing routines for code version handling, cooperation in coding, software tool standardization and exploration, coding training and practice etc. The developed solution will be fully based on EPICS(compatible with), but also support other possibilities.

MESI: The STAP appreciated the Integration Workflow document provided. The task list provided is extensive, but plainly covers tasks outside of MESI's domain, such as the helium liquefier and recovery system, and integration with neutron detectors. More broadly, MESI is currently handling issues from wiring to EPICS integration. This requires a diverse range of expertise. It is important to define a clear interface with ICS and DMSC, as well as clear information on how much of their resources can be closed upon. Completion of many of MESI's projects is dependent on support by ICS and DMSC. This affects other activities in NSS, and the STAP encourages strengthening coordination efforts for beamline controls as a whole.
Prioritisation and planning of SE integration and development project in MESI has improved given the prioritising table (presented last time) has been restructured to provide a better overview of MESI involved integration and development projects. It now also includes a better traceability between sample environment system projects (SES) (id from "suite" list), up to project in BCT and down into specific sub Sample Environment Equipment(SEE) integration projects. The weekly routine to update on progress and discuss prioritisation of this list within the SE team is starting to settle. A long list of projects are lined up both in integration and development, 2019 is already full. The projects activate the full range and more of MESI competence and scope.